



SUBSEA TECHNOLOGY

Réunion Géodésie fond de mer Paris – 6 sept 2018

Aude Kuchly Account Manager – Based in Nice France POSITIONING NAVIGATION COMMUNICATION MONITORING IMAGING

Your partner for Seabed monitoring – relative and absolute positionning

Agenda

• Sonardyne 47 years of data in subsea acoustic

- Why Sonardyne as partner of choice for seabed monitoring?
- Topside modems options
- Instrument options
- FETCH as an exemple of how Sonardyne has matured the technology to undertake in the geodesy field.



Relative Measurement





'Fetch' transponders on the seabed

Case Study: Geomar GeoSea Array -71'43'30" -71'05' -71'04' -71/03 -71'44'00" -70"49'48" -70'49'12" -70'48'36" -70'48'00' A1002 **A104** -20'47'24" -20'47 A108 A102 A205 A101 20'48'00* 20'48 -21'03'30" 0 -4050 -4000 -3000 -2900 -2800 -2700 -2600 -2500 -2400 -4150 -4100 5800 - 5700 - 5600 - 5500 - 5400 - 5300 - 5200 - 5100 - 5000 4200 1000 2000 3000 4000 5000 6000 7000 8000 65mm/yr

Case Study: Geomar GeoSea Array

In 2015, Geomar deployed the world's first subduction zone monitoring system off the west coast of Chile:

- 23 AMT in 4m high tripods
- 2,000 6,000m depth •
- Baseline ca. 1km
- Complements onshore obs from • the existing Integrated Plate **Boundary Observatory Chile**
- **3 Year Deployment**
- Data recovery via Waveglider •



Iquique

Tocopilla

Sonardyne SOUND IN DEPTH

Seabed monitoring : instrumentation users

Supporting the World's Leading Ocean Institutes



Topside Modems : Dunker, HPT, Waves Glider /ASV transceiver











Dunker 6

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- 6G[®] Sonardyne Wideband[®]2 telemetry transceiver:
 - Supports all Sonardyne Wideband[®]2 spread spectrum acoustic communications (100 – 9k bits per sec)
 - Enables configuration or retrieval of data
 - Real-time diagnostics available on ranges to enable quality control
 - Compatible with AMT, PIES, Fetch
- Rugged dunking system:
 - Super duplex stainless steel housing (1,000m rated)
 - Shock and vibration isolated electronics
 - 100 m of cable on a stainless steel cable drum with brake and locking mechanism
 - 10 m deck cable between the 48 V Surface Interface Unit (SIU) and the cable drum
 - Easily replaceable 8-way SubConn connection to the cable drum
- Options:
 - MF or LMF frequency band
 - Omni or directional transducer
- High power output and Sonardyne Wideband[®]2 signal processing enables operation even when deployed from noisy vessels or in multipath/shallow water environments.
- Internal Lithium-ion rechargeable battery pack with 3 day life (listening):
 - Maintains transmit Source Level (SL)
 - Minimises supply current for long dunker cables
 - Enables relocation of the dunker if the cable is cut.



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HPT High Speed Telemetry Transceiver

- 6G[®] Sonardyne Wideband[®]2 telemetry transceiver:
 - Supports all Sonardyne Wideband[®]2 spread spectrum comms (100 9k bits per sec)
 - Enables configuration or retrieval of data
 - Improved performance over Dunker 6:
 - Multi-element receiver with improved SNR and surface baffling for long slant range to systems deployed at abyssal depths.
 - Built in health checks including array and electronics diagnostics
 - Discovery mode allows users to automatically scan for transponders deployed within acoustic range
 - In water ambient noise monitoring
 - Compatible with AMT, PIES, Fetch
- Rugged dunking modem system:
 - Aluminium Bronze housing (1,000m rated)
 - Shock and vibration isolated electronics
 - 100 m of cable on a stainless steel cable drum with brake and locking mechanism
 - 10 m deck cable between the 48 V Surface Interface Unit (SIU) and the cable drum
 - Easily replaceable 8-way SubConn connection to the cable drum
- MF (HPT5000 or HPT70000) or LMF (HPT 7000L) frequency band
- Optional Ethernet connectivity



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Wave Glider or any ASV Transceiver

- 6G[®] Sonardyne Wideband[®]2 telemetry transceiver:
 - Supports all Sonardyne Wideband[®]2 spread spectrum comms (100 – 9k bits per sec)
 - Enables direct remote data collection, monitoring and control from shore based Wave Glider operations centre;
 - Sonardyne Wideband[®] 2 compatible navigation functions including range measurement
 - Compatible with AMT, PIES, Fetch
- Tight integration into Wave Glider or any other ASVs:
 - Wave Glider communications and power systems
 - Data are passed by Wave Glider to the Iridium satellite system for onwards transmission to the user in near real time.
 - Installed in Wave Glider standard aft payload space;
 - MF and LMF directional transducer options
 - Internal 2.2Ah rechargeable battery



Seabed Instrumentation options – AMT & Fetch







Inherent Sonardyne 6G Wideband flexibility





AMT Key Characteristics





- Sonardyne 6G Wideband telemetry (100 – 9,000 bps)
- Transducer options:
 - MF Omni
 - MF Directional
 - LMF Directional

- Alkaline and Lithium Battery Options
- Maxi (double batery) option available

Release mechanism



- MEMS inclinometer
- Battery temperature
- Tilt switch

Choice of high precision (± 0.01%) pressure sensors :

- DigiQuartz
- Presens
- Keller

Optional sensors:

- Sound speed ± 0.017 m/s
- High accuracy Jewell inclinometer ± 0.05°
 over 0 ± 15°
- High precison PRT (Pt100):
 - Range -5 to +35° C
 - Accuracy ± 0.015° C
 - Resolution ± 0.0001° C

Fetch Overview

Fetch is a long-life subsea autonomous logging instrument that can be fitted with a variety of sensors and has an integrated high speed acoustic modem for wireless recovery of data.

- Range of sensor options
- Ultra-low power platform
 - Integrated data storage and recovery
 - Remote configuration
 - Compatibility with Sonardyne 6G
- Cost effective deployments

Fetch Key Characteristics

Sonardyne 6G Wideband telemetry (100 – 9,000 bps) Transducer options:

- MF Omni
- MF Directional
- LMF Directional

Battery Options:

- LSH20 single 180 Ah
- LS33600 single 250Ah
- LS33600 dual 505Ah

Logging to duplicate SD cards



0.05° over 0 - ± 15°

Sound in depth

Sound in depth

FETCH AZA – NEW DEVELOPMENT

- Fetch can accommodate the AZA mechanism,
 - power and operate the sub-system and log
 - AZA data for 5+ years.
- Acoustic download of logged data.
- Post-processing can remove drift from logged
 - seabed pressure.
- Separate information on AZA available.

New capabilities for science

"With this approach, we are taking a new path in earthquake research since previously, measurements with a precision of a few millimetres were hardly possible"

Dr Dietrich Lange, GEOMAR







Sonardyne sound in depth

Deployment Solutions – Learning from our long experience delivering at Sea



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Fetch - Deployment exemple 1 - Short Frame for Non-Ranging

- Weight in air 60kg
- Weight in water 52kg
- 1,288mm (base) x 615mm (height)
- 1,267mm high with PIES
- Mud feet optional



Fetch – Deployment exemple 2 - Tall frame for Baseline Ranging

- Suspended from lifting point.
- Tilt allows automatic unnesting of tripods
- Can be lifted daisy-chained
 Mud-base optional





Fetch – Deployment exemple 3 - Anti-trawl Frame

- Stable seabed platform to protect Fetch from incidental damage and displacement
- Polypropylene

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- Depth rated to 1000m
- Mass (excluding Fetch and ballast)
 - Lid 35kg
 - Base 68kg
 - Total mass depending on user-added ballast 300kg

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(MIL Sonardyne

Low footprint pressure ensures minimal seabed compaction





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Fetch – Deployment exemple 4 - No Stand

- Scripps fit their Fetch with 3 feet, which slot into 3 grooves in a concrete base
- This enables the unit to be replaced in the base with millimetric registration
- Sonardyne do NOT supply this option







Sustained Seabed Observations

Fetch - Deployment exemple 5 - Flotation

- Acoustic (screw-off) release option available for all Fetch variants
- However, 6,000m Fetch has insufficient buoyancy on its own
- Consequently extra flotation available is available:
 - As additional glass sphere
 - Syntactic foam collar (right)



Sonardyne has matured the technology to undertake this on the field.

Conclusion





Sonardyne

SOUND IN DEPTH

Nous vous remercions pour votre confiance et nous réjouissons de mettre notre expertise au service de la communauté scientifique.

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